

**Date :** September 5, 2017

*SAMPLE IDENTIFICATION*

**Internal code :** 17H30-GUR11-1-DM

**Customer identification :** Peppermint - 3G02

**Type :** Essential oil

**Source :** *Mentha x piperita*

**Customer :** GuruNanda LLC.

*ANALYSIS*

**Method :** PC-PA-001-15E06, "Analysis of the composition of a liquid essential oil by GC-FID" (in French).

Identifications double-checked by GC-MS.

**Analyst :** Alexis St-Gelais, M. Sc., chimiste

**Analysis date :** 2017-09-01

Checked and approved by :



Alexis St-Gelais, M. Sc., chimiste 2013-174

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IDENTIFIED COMPOUNDS

Identification	Column: BP5			Column: WAX			Molecular Class
	R.T.	R.I.	%	%	R.I.	R.T.	
<i>cis</i> -Hex-3-en-1-ol	2.46	862	0.03	0.02	1323	5.63	Aliphatic alcohol
Hexanol	2.73	882	0.01	0.02	1292	5.13	Aliphatic alcohol
2,5-Diethyltetrahydrofuran	2.91	896	0.02	0.02	971	1.34	Furan
$\alpha$ -Thujene	3.31	920	0.05				Monoterpene
$\alpha$ -Pinene	3.42	926	0.68	0.67	941	1.20	Monoterpene
Camphene	3.71	944	0.02				Monoterpene
3-Methylcyclohexanone	4.03	962	0.02	0.12	1251	4.51	Aliphatic ketone
Sabinene	4.14	969	0.48	0.49	1058	2.05	Monoterpene
$\beta$ -Pinene	4.20	973	0.97	0.90	1037	1.88	Monoterpene
Myrcene	4.48	989	0.22	0.18	1113	2.65	Monoterpene
Octen-3-ol	4.52	991	0.17	0.19	1397	6.84	Aliphatic alcohol
Octan-3-ol	4.80	1007	0.26	0.29	1344	5.95	Aliphatic alcohol
$\alpha$ -Terpinene	4.94	1015	0.34	0.35	1121	2.74	Monoterpene
para-Cymene	5.14	1026	0.07	0.10	1210	3.90	Monoterpene
Limonene	5.18	1028	1.66	6.25	1143	3.04*	Monoterpene
1,8-Cineole	5.24	1031	4.55	[6.25]	1143	3.04*	Monoterp. ether
<i>cis</i> - $\beta$ -Ocimene	5.35	1037	0.33	0.86	1191	3.62*	Monoterpene
<i>trans</i> - $\beta$ -Ocimene	5.53	1047	0.09	0.08	1204	3.82	Monoterpene
$\gamma$ -Terpinene	5.72	1057	0.56	[0.86]	1191	3.62*	Monoterpene
<i>cis</i> -Sabinene hydrate	6.06	1076	1.25	1.09	1404	7.00	Monoterp. alcohol
Terpinolene	6.20*	1083	0.17	0.14	1225	4.13	Monoterpene
Octanol	6.20*	1083	[0.17]	4.42	1499	9.35*	Aliphatic alcohol
Nonan-3-ol	6.61	1103	0.04	0.05	1442	7.90*	Aliphatic alcohol
Linalool	6.70	1106	0.38	0.27	1496	9.22	Monoterp. alcohol
<i>trans</i> -Sabinene hydrate	6.76	1109	0.12	0.14	1478	8.78	Monoterp. alcohol
<i>cis</i> -para-Menth-2-en-1-ol	7.25	1126	0.09	[4.42]	1499	9.35*	Monoterp. alcohol
<i>trans</i> -para-Menth-2-en-1-ol	7.73	1144	0.04	0.64	1555	11.40*	Monoterp. alcohol
Isopulegol	7.86	1148	0.11	[4.42]	1499	9.35*	Monoterp. alcohol
Menthone	8.13	1158	22.57	22.69	1394	6.76	Monoterp. ketone
Menthofuran	8.23	1162	3.71	6.88	1409	7.13*	Monoterp. ether
Isomenthone	8.32	1165	2.95	[6.88]	1409	7.13*	Monoterp. ketone
neo-Menthol	8.57	1174	3.13	3.43	1529	10.43*	Monoterp. alcohol
Borneol	8.64	1177	0.29	2.82	1619	14.12*	Monoterp. alcohol
Terpinen-4-ol	8.82†	1183	39.90	0.71	1525	10.28	Monoterp. alcohol
Menthol	9.10†	1194	[39.90]	39.26	1577	12.24	Monoterp. alcohol
Isomenthol	9.20	1197	0.70	[0.64]	1555	11.40*	Monoterp. alcohol
neo-iso-Menthol	9.37	1201	0.18	0.23	1615	13.94	Monoterp. alcohol
$\alpha$ -Terpineol	9.53	1205	0.18	[2.82]	1619	14.12*	Monoterp. alcohol
( <i>Z</i> )-Hex-3-en-1-yl isovalerate	10.78	1232	0.03	[0.05]	1442	7.90*	Aliphatic ester
Pulegone	11.01	1237	1.61	1.58	1547	11.10	Monoterp. ketone

Carvone	11.42	1246	0.02	0.36	1638	15.16*	Monoterp. ketone
Piperitone	11.81	1255	0.56	[2.82]	1619	14.12*	Monoterp. ketone
neo-Menthyl acetate	12.39	1268	0.21	0.17	1463	8.42	Monoterp. ester
Dihydroedulan I	13.09	1283	0.04	0.38	1451	8.12*	Edulan
Menthyl acetate	13.40	1290	4.17	[4.42]	1499	9.35*	Monoterp. ester
Isomenthyl acetate	14.02	1302	0.23	0.25	1507	9.65	Monoterp. ester
Bicycloelemene	15.01	1317	0.05	0.07	1420	7.37	Sesquiterpene
$\alpha$ -Copaene	17.69	1357	0.04	0.10	1432	7.65	Sesquiterpene
$\beta$ -Bourbonene	18.13	1364	0.36	[0.38]	1451	8.12*	Sesquiterpene
$\beta$ -Elemene	18.92	1375	0.05	[3.43]	1529	10.43*	Sesquiterpene
$\beta$ -Caryophyllene	20.62	1401	2.00	1.98	1519	10.05*	Sesquiterpene
$\beta$ -Copaene	21.51	1411	0.06	[1.98]	1519	10.05*	Sesquiterpene
$\alpha$ -Humulene	23.38	1433	0.07	0.04	1585	12.54	Sesquiterpene
<i>trans</i> - $\beta$ -Farnesene	24.51	1447	0.37	[2.82]	1619	14.12*	Sesquiterpene
Germacrene D	25.65	1460	2.00	[2.82]	1619	14.12*	Sesquiterpene
Bicyclogermacrene	26.84	1475	0.31	[0.36]	1638	15.16*	Sesquiterpene
$\alpha$ -Muurolene	27.77	1486	0.06	[0.36]	1638	15.16*	Sesquiterpene
$\gamma$ -Cadinene	28.70	1497	0.03	0.04	1665	16.61	Sesquiterpene
$\delta$ -Cadinene	29.33	1505	0.08	0.09	1672	16.96	Sesquiterpene
Viridiflorol	34.81	1583	0.22	0.23	1972	35.87	Sesquiterp. alcohol
<b>Total identified</b>			<b>98.91%</b>	<b>98.6%</b>			

\*: Two or more compounds are coeluting on this column

[xx]: Duplicate percentage due to coelutions, not taken account in the identified total

†: Peaks apexes were resolved, but peaks overlapped and were summed for analysis

Note: no correction factor was applied

#### OTHER DATA

**Physical aspect** : Clear liquid

**Refractive index** : 1.4605 ± 0.0003 (20 °C)

#### COMPLIANCE WITH NF T 75-210:2008 – OIL OF PEPPERMINT (*MENTHA X PIPERITA*)

Compound	USA type		Other type		Observed %	Complies?
	Min. %	Max. %	Min. %	Max. %		
3-Octanol	0.1	0.4	0.1	0.5	0.3	Yes
1,8-Cineole	4.0	6.0	3.0	8.0	4.6	Yes
Limonene	1.0	2.5	1.0	3.0	1.7	Yes
<i>trans</i> -Sabinene hydrate*	0.5	2.3	0.5	2.0	1.3	Yes
Menthone	15.0	25.0	13.0	28.0	22.6	Yes
Isomenthone	2.0	4.5	2.0	8.0	3.0	Yes
Menthofuran	1.5	6.0	1.0	8.0	3.7	Yes
Neomenthol	2.5	4.5	2.0	6.0	3.1	Yes
Menthol	36.0	46.0	32.0	49.0	39.3	Yes
Pulegone	0.5	2.5	0.5	3	1.6	Yes
Menthyl acetate	3.0	6.5	2.0	8.0	4.2	Yes
β-Caryophyllene	1.0	2.5	1.0	3.5	2.0	Yes
<b>Refractive index</b>	1.459	1.465	1.459	1.465	1.4605	Yes

\*The AFNOR norms nomenclature for this compound appears to be confounding. The value indicated in the table is for *cis*-sabinene hydrate, as recommended for this compound by Robert P. Adams.

#### CONCLUSION

No adulterant, contaminant or diluent were detected using this method. The oil complies with the AFNOR standards.



17H30-GUR11-1-DM\_WAX

